INJURIES AND DISEASES OF THE HYOID BONE.*

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THE hyoid bone is a small structure, and is situated in such a position as to be well protected from injury, yet one is surprised to find so little space devoted to a study of its diseases and injuries. A careful search of the literature will show only a moderate consideration of the fractures of this bone, and almost none of its other pathological conditions.

Fractures of the hyoid bone are of very exceptional occurrence, and are usually produced by a direct blow or fall, or by lateral compression, as by the pressure of an adversary's hand on the throat, and in a few cases by muscular contraction. It is also well known that the bone is sometimes fractured by judicial, but not by suicidal hanging. The fracture is usually that of one of the greater cornua, but occasionally the body of the bone has been broken and fracture of both cornua has been observed. As the bone is usually broken by throttling, the right cornu is the part most often fractured, owing to the pressure of the right thumb of the assailant.

The symptoms are generally quite characteristic; the patient usually feels a distinct snap, or sensation of a solid body giving way in the upper part of the neck, with severe pain, difficulty in speaking, swallowing or even in breathing, and cough. Increased mobility of the parts may be elicited, and sometimes crepitus. The fragments may be driven inwards and perforate the mucous membrane of the pharnyx and cause bleeding from the mouth. Swelling and ecchymosis may occur externally, and a finger introduced into the pharynx may feel the ends of the broken bone. The injury is serious from its accompanying complications, and death has followed in several

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instances, but if life is preserved, bony union usually takes place. I have a well marked example of fracture of the hyoid bone with bony repair, in my collection, obtained from a cadaver (Fig. 1).

The treatment is directed more towards relieving the threatening symptoms than towards the fracture. If there is severe dyspnœa, a tracheotomy may be required; if dysphagia, the patient must be fed for many days through a tube, or by rectal enemata. Silence must be enjoined and all movements of the tongue prohibited. The fragments may be replaced by pressure with the finger in the pharynx, and counter pressure from without, and the head should be immobilized in the extended or flexed position, as is most comfortable to the patient and most effective in preserving reduction. If apposition cannot be maintained, I do not see any objection to suturing the fragments together. At times an abscess forms and a sequestrum may be thrown off. Occasionally the voice is changed for a long time, or permanently.

Inflammations of the hyoid bone may result from external violence or from constitutional disease, and usually begins as a periostitis, with localized pain, swelling, dysphagia and dyspnœa. Suppuration generally occurs, and if the pus is not promptly evacuated it may burrow in many directions, and cause extensive havoc. Necrosis of the bone is likely to occur in such conditions, usually limited in extent, though the whole bone has been known to die and be cast off. After the extrusion of the sequestrum, the functions of the bone appear to be but little affected.

Neoplasms of the hyoid bone are of great infrequency, and I have only been able to find five or six cases reported in the literature that is accessible to me.

In most of the works on surgery which I have been able to consult, no mention is made of tumors of the hyoid bone at all, and the references to the subject in the literature are exceedingly sparse. A writer in von Bergmann's Surgery, American edition, 1904, page 38, says, that only two cases of primary tumor of the hyoid bone are recorded in all litera-

FIG. 1.—Fracture of great cornu of hyoid bone.

ture. The occurrence of neoplasms of the hyoid bone, both primary and secondary, is without doubt of great rarity, but I have been able to collect five or six cases, inclusive of one of my own, which I will report briefly at this time.

CASE I.—*Enchondroma of the hyoid bone*, reported by E. Boekel in the *Gazette de Strasbourg*, in 1862, with the remark that it "is unique in literature."

"A woman, 50 years of age, observed in 1859 a tumor on the right side of the throat, which gradually increased in size. The neoplasm was the size of two fists, fluctuating, and hard at its base like cartilage. It raised up the inner head of the sterno-cleido-mastoid and pressed against the larynx, then extended under the chin and terminated in a blunt point 2 cm. below the sterno-clavicular articulation. It was somewhat movable, and the skin was not adherent to the growth. The thyroid gland was small and not involved. Swallowing solids was very difficult, but respiration was not impeded. On puncture of the tumor several grams of liquid jelly escaped. There was no pain. Extirpation was done, and the growth was found to arise from the horn of the hyoid bone, which was resected and the tumor easily removed. There was very slight bleeding. The growth was 12 cm. long and 7 cm. thick. It rose from the periosteum of the horn of the hyoid bone, and consisted of hyaline cartilage with a great number of cells. The patient did well until the fourth day, when secondary hæmorrhage set in, and notwithstanding the ligature of both the external, and, later, common carotid artery, she died of anæmia and exhaustion."

This case is quoted by Dr. J. Spisharny, of Moscow, in the *Deutsche medicinische Wochenschrift*, vol. xviii, p. 853, 1892.

CASE II.—*Tumor springing from the horn of the hyoid bone, causing suffocation through lateral compression of the epiglottis.* "On November 5, 1867, a man, aged 23, appeared, of fair and delicate complexion, who spoke in a very guttural manner, as if his mouth was full of food. Six months previously his voice had become affected, commencing with a cold and sore throat. A swelling formed on the left side of the neck, which affected speech and swallowing, with dyspnœa at times, especially at night, and sometimes a little cough. He could swallow solids and liquids, but as the tumor increased in size this varied, and he became thinner. His previous health had been excellent. He became very weak, with a feeble pulse. The fauces appeared healthy. By laryngoscopic examination a rounded tumor the size of a large walnut was seen on the left side of the throat at the root of the tongue and pushing the epiglottis to the right and compressing the epiglottis laterally, so that it looked as if folded in two. The entrance to the larynx was obstructed. The tumor appeared somewhat ulcerated, and was hard, but not painful. In the neck externally there was a swelling above the thyroid cartilage and connected with the left horn of the hyoid bone. It had increased in size somewhat rapidly of late. No operation was done and the man returned home,

where he died suddenly on November 9, 1867. The growth was supposed to be malignant, but no microscopic examination was made."

Reported by Sir G. Duncan Gibb in the Transactions of the Pathological Society of London, vol. xix, p. 59, 1868.

CASE III.—*Primary enchondroma springing from the great horn of the hyoid bone. Excision and recovery.* "On March 22, 1891, a man, 25 years old, came under observation. On the right side of the throat, immediately below the lower jaw, in the location of the hyoid bone, was a tumor the size and form of a hen's egg. The skin was not altered, and was movable. The tumor was rough, hard and but slightly movable, and was connected with the right horn of the hyoid bone and followed the movements of this bone. It was not painful. The thyroid cartilage was pushed to the left of the middle line. The orifice of the larynx could not be seen, but a lump the size of a walnut could be felt at the base of the tongue, which was rough, hard and but little movable, and was connected with the growth in the throat. The corresponding tonsil was swollen. A laryngoscopic examination was impossible. Swallowing solids was difficult, the voice hoarse, and respiration labored when he was on his back. The respirations were 26 to the minute. The patient was well nourished and the other organs normal. Eleven years ago he noticed that his voice was hoarse. No lump was observed at that time, but five years later the swelling was noticed and grew slowly. Five months before coming to the clinic he began to have dysphagia, and marked hoarseness of voice. On April 10, 1891, under narcosis, Professor Sklifosowsky operated in the following manner: An incision was made at the level of the angle of the mouth and extended in a curved manner to the cricoid, the sterno-mastoid, and vessels pulled outwards and the growth enucleated, when it was seen that it had developed from the right horn of the hyoid bone. Releasing the growth was not easy, and was accomplished by blunt dissection with the index finger. The bleeding was slight. Only the facial, lingual, and a few small vessels were ligated. The right horn was excised at its junction with the body of the bone. He was discharged well in a month. After the operation the temperature remained normal, the voice became clear, and the breathing and swallowing perfect. The tumor was iregularly oval in shape, length 7 cm., breadth 6 cm., and thickness 4½ cm. The structure was mostly hyaline cartilage, rich in cells, and the tumor surrounded with a connective-tissue capsule."

Reported by Dr. J. Spisharny, *Deutsche med. Wochenschrift*, vol. xviii, p. 853, 1892.

CASE IV.—*Mixed round and spindle-celled sarcoma of the hyoid bone. Recovery.* "The patient was a negro, aged 24 years, married, waiter. No family history of malignancy but of tuberculosis. Has had gonorrhœa, but not syphilis. There was a lump the size of an English walnut beneath the chin. The skin was stretched and ulcerated at one point; the larynx was not involved. The tumor is away from the median line and upon the right greater cornu of the hyoid bone. It has been growing for five months, and has been painful one month, and is now very tender. Deglutition and respiration are interfered with. Chloroform anæsthesia.

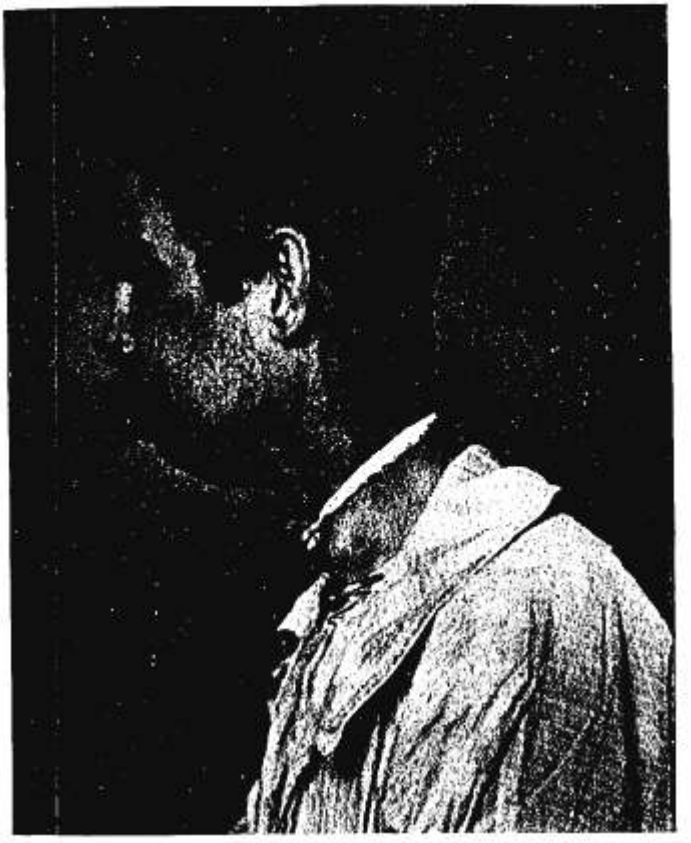

FIG. 2.—Total extirpation of hyoid bone, base of tongue, larynx and part of pharynx for sarcoma. 1906. Recurrence.

Operation on April 7, 1898. Dr. Dawbarn excised the left external carotid artery. Ten days later the right carotid was excised, and the growth ablated. The tumor was encapsulated and easily removed. It was attached to the greater horn of the hyoid bone, and one-half of the hyoid was removed. The mouth was not opened, nor was the thyro-hyoid membrane torn. Some suppuration occurred, but the man recovered and resumed work."

Prize essay by Dr. R. H. M. Dawbarn, "The Treatment of Certain Malignant Growths by Excision of the External Carotids," page 33.

CASE V.—*Sarcoma of the hyoid bone and larynx, with excision of the tumor of the hyoid, base of the tongue, larynx and part of the pharynx, under local anæsthesia.* Case of Dr. R. WINSLOW. (Fig. 2.) On January 9, 1906, Joseph Ward, age 45, white, tailor by occupation, was admitted to the University Hospital, having been sent in from the nose and throat dispensary, where he was examined by Professor John R. Winslow. He was at that time suffering from dyspnœa, due to a growth in the region of the hyoid bone, which so pressed on the epiglottis and larynx as to produce difficult respiration, and to prevent a laryngoscopic examination of the air passages. The diagnosis was tumor of the hyoid bone, involving the larynx. The patient is married and has four healthy children. His parents lived to a good old age, and he does not know the cause of death of either of them. He has had the usual diseases of childhood, as well as small-pox, and 16 years ago had a sore on the penis with suppurating inguinal glands, but this was not followed by any secondary symptoms. Thirteen years ago he noticed a small lump in the left side of the neck, which was excised by Professor W. W. Keen at the Jefferson Hospital, Philadelphia. Through the kindness of Professor Keen the following history has been obtained:

"Ward, Joseph, age 34, was admitted to the Jefferson Hospital on March 31, 1893; discharged April 6, 1893. He had a tumor in the right side of the neck the size of a hulled walnut. He complained of no pain or any other symptom. The presence of the tumor was the only physical sign. There was no family history of tuberculosis or malignant disease. The tumor was removed by Dr. W. W. Keen, April 1, 1893. He found it attached to the hyoid bone and the side of the larynx. Five days later the patient left the hospital with the wound entirely healed."

No pathological examination of the growth was recorded.

This history is probably erroneous in stating the tumor to have been located on the right side, as there was a well-defined scar on the left side of the neck and none on the right, and the patient said the growth was on the left side. He had been a regular drinker, but, he says, never to excess. After the removal of the growth mentioned above he enjoyed good health for three years, when he noticed a recurrence, and it has been increasing in size slowly ever since. About five weeks before admission to hospital the respiration began to be interfered with and there was some difficulty in deglutition. His voice is altered and he has some cough. He is pale, emaciated, and weak. There is marked dyspnœa, with stridor, which makes an examination of the chest difficult. The heart is exceedingly feeble and beats from 110 to 140 times a minute. The apex beat is not visible or palpable, but the heart sounds are clear and the second aortic sound is accentuated. The abdomen presents nothing of importance. There is a large swelling occupying the location of the hyoid bone and extending more towards the left than the right side of the neck. The enlargement is globular, as large as a goose's egg, hard, and freely movable. It is not painful, but causes discomfort. The Adam's apple can be seen and felt below the tumor, and the larynx is not enlarged or displaced. A skiagraphic picture fails to show the hyoid bone, but a shadow of a growth is faintly seen in the area between the jaw and the larynx.

On January 11 his respiration had become so impeded that immediate relief was demanded, and a laryngotomy in the cricothyroid space was done, under cocaine. This relieved his dyspnœa and rendered him much more comfortable. He was desirous of having the growth removed, but his condition did not justify such a serious procedure. He was therefore put on tonics, with digitalis, and fed well, and his pulse gradually increased in strength and diminished in frequency, ranging from 70 to 100 per minute, but still of very poor volume. As he still wished to be operated on, it was thought unwise to place him under a general anæsthetic, hence he was given one ounce of whiskey every hour by mouth from three to eight A.M., and morphia, grain one-quarter, and scopolamin, grain one one-hundredth, one-half hour previous to operation, and infiltration anæsthesia of the skin with Schleich's solution was effected. On February 1, 1906, he was properly prepared, and while still awake the operation was under-

taken and completed. The tumor of the hyoid was first removed with a part of the base of the tongue, when it was seen that the larynx was also involved. The incision was therefore extended downwards in the middle line, the skin reflected, and the whole larynx easily removed without hæmorrhage. The end of the trachea was brought out at a lower level and sutured to the skin. A large gap was left, leaving a wide opening into the pharynx. The pharynx was sutured to the base of the tongue and closed in the middle line so as to make a funnel-shaped canal, and the skin was loosely sutured. The patient stood the operation very well, complained of but little pain, and was in as good condition at its close as at its beginning. I am confident he would not have survived a general anæsthetic. He was returned to bed and put in an almost upright position to facilitate the swallowing of the saliva, and a tracheal tube was kept in the trachea. At first a large soft rubber catheter was passed from the mouth into the œsophagus and water and milk allowed to run into the stomach. but subsequently the lower part of the pharynx opened and the tube was passed into the œsophagus from the neck. There was a free discharge of saliva from the opening in the neck, which was kept from entering the trachea by wrapping the tracheal tube with gauze. The incisions healed promptly except a small place at the bottom, and the patient gained in strength. Three quarts of milk, with eggs and whiskey, were administered daily. He soon sat up and walked around the ward, and in a measure enjoyed life, but in the latter part of March there was a recurrence in the lower portion of the neck, as well as in situ, and he gradually failed and died on March 27.

The tumor was a round-celled sarcoma. A few injections of Coley's mixed toxines were given, as well as X-ray treatments, without benefit. The autopsy showed extensive metastases in the lungs, bronchial glands, liver, and mesenteric glands as well as in the tissues of the neck. I regard this case as a primary sarcoma of the hyoid bone, subsequently extending to the larynx, but of this there is doubt. Professor Hirsh, who examined the tumor of the hyoid, not finding any myeloid cells, is inclined to think the starting point was in the epiglottis.

The hyoid bone was completely destroyed by the growth, only some calcareous particle remaining, while the epiglottis was not entirely destroyed, nor was the larynx as much involved as

one would expect if the growth had originated in the epiglottis. The patient said the growth began to recur three years after the removal of the tumor by Dr. Keen, approximately 10 years ago.

CASE VI.—*Osteoma of the right horn of the hyoid bone,* reported by Dr. John C. Warren, "Surgical Observations on Tumors," page 117. The patient was a man who applied to his father, Dr. John Warren, on account of a lump in his neck. This was a conical exostosis of the right horn of the hyoid bone, nearly three inches in length. This was excised and the man recovered.

Even secondary growths of the hyoid are of great rarity, but Spisharny mentions one case, in which Peter found a metastasis in the body of the bone, at the autopsy of a person who died of cancer of the œsophagus.

Tumors of the hyoid bone, as far as they have been reported, have been either sarcoma, enchondroma, or osteoma, and doubtless this bone is subject to all the neoplasms that are found in the other bones of the body, though with great infrequency.

In the cases tabulated the ages varied from 23 to 50 years of age, and five of the six occurred in men. The length of time intervening between the first observation of the tumor and the removal of the growth, or death of the patient, varied from five months to thirteen years. The growth also varied in size, having been the size of two fists in an enchondroma, goose's egg, hen's egg, conical osteoma three inches in length, and an English walnut.

Deglutition was affected generally, and respiration more or less embarrassed. The voice was altered in nearly all cases, and pain or discomfort was generally present. Cough was also present in some cases. Of the six cases five were subjected to operation with four operative recoveries and one death from secondary hæmorrhage. One case succumbed eleven weeks after the operation from local and general metastases, and one died suddenly without operation, probably from asphyxia, as the larynx was compressed by the growth.

The treatment of tumors of the hyoid bone, whether benign or malignant, should be thorough removal, at as early

a period as possible, with as much of the contiguous tissues as may be necessary. The extirpation of this bone, even when it becomes necessary to excise the larynx and other contiguous tissues, is not attended with extraordinary danger, and the possibility of a permanent cure in malignant cases depends upon an early and radical operation.